# CLAIMS

1. A coated machine tool comprising a multilayer wear resistant coating for application to a base material of said machine tool, said coating comprising a relatively hard underlayer and a chemically inert overlayer, wherein:

said relatively hard underlayer is formed over said base material of said machine tool;

said overlayer is formed over said underlayer;

said overlayer is substantially chemically inert with respect to titanium; and

said overlayer comprises an oxide of yttrium.

2. A coated machine tool as claimed in claim 1 wherein said chemically inert overlayer comprises $Y_2O_3$.

3. A coated machine tool as claimed in claim 1 wherein said chemically inert overlayer has a thickness of between about 0.5 and about 3.0 microns.

4. A coated machine tool as claimed in claim 1 wherein said chemically inert overlayer has a thickness of about 0.6 microns.

5. A coated machine tool as claimed in claim 1 wherein said relatively hard underlayer comprises a pair of layers, one of said layers comprising a metal and the other of said layers comprising a metal nitride, metal carbide, or metal carbo-nitride.

6. A coated machine tool as claimed in claim 5 wherein said metal comprises a layer of material selected from a group comprising Ti, Cr, Al, and combinations thereof.

7. A coated machine tool as claimed in claim 1 wherein said relatively hard underlayer comprises a layer of material selected from a group of metal nitrides, metal carbides, metal carbo-nitrides and combinations thereof.

8. A coated machine tool as claimed in claim 1 wherein said relatively hard underlayer comprises a layer of material selected from a group including TiN, TiCN, TiAlN, and combinations thereof.

9. A coated machine tool as claimed in claim 1 wherein said relatively hard underlayer comprises titanium and yttrium.

10. A coated machine tool as claimed in claim 9 wherein said relatively hard underlayer comprises TiAlYN.

11. A coated machine tool as claimed in claim 1 wherein said relatively hard underlayer comprises a layer of material including components selected from a group including Ti, Cr, Al, Zr, Hf, Y, and combinations thereof.

12. A coated machine tool as claimed in claim 1 wherein said relatively hard underlayer comprises a metal nitride, carbide, or carbo-nitride monolayer.

13. A coated machine tool as claimed in claim 1 wherein said relatively hard underlayer comprises a multilayer structure including an elemental metallic layer and a nitride, carbide, or carbo-nitride metallic layer.

14. A coated machine tool as claimed in claim 1 wherein said relatively hard underlayer has a thickness of between about 1 and about 5 microns.

15. A coated machine tool as claimed in claim 1 wherein said relatively hard underlayer has a thickness of about 2 microns.

16. A coated machine tool as claimed in claim 1 wherein said multilayer wear resistant coating further comprises an interlayer between said underlayer and said overlayer, and wherein said interlayer comprises a metal.

17. A coated machine tool as claimed in claim 16 wherein said metal interlayer comprises a metal selected from Ti, Al, Zr, Hf, Nb, V and combinations thereof.

18. A coated machine tool as claimed in claim 16 wherein said interlayer comprises at least two different materials and wherein the relative proportions of said two different materials are graded across said interlayer.

19. A coated machine tool comprising a multilayer wear resistant coating for application to a base material of said machine tool, said coating comprising a relatively hard underlayer and a chemically inert overlayer, wherein:

said relatively hard underlayer is formed over said base material of said machine tool;

said overlayer is formed over said underlayer;

said overlayer is substantially chemically inert with respect to titanium; and

said overlayer comprises a metal oxide.

20. A coated machine tool as claimed in claim 19 wherein said metal oxide comprises a rare earth oxide.

21. A coated machine tool as claimed in claim 19 wherein said metal oxide comprises an oxide of scandium

22. A coated machine tool as claimed in claim 19 wherein said metal oxide comprises an oxide of lanthanum.

23. A coated machine tool as claimed in claim 19 wherein said metal oxide comprises an oxide of yttrium.

24. A coated machine tool as claimed in claim 19 wherein said metal oxide comprises an oxide of zirconium.

25. A coated machine tool as claimed in claim 19 wherein said metal oxide comprises an oxide of hafnium.

26. A coated machine tool as claimed in claim 19 wherein said metal oxide comprises an oxide of niobium.

27. A coated machine tool comprising a wear resistant coating for application to a base material of said machine tool, said coating comprising a chemically inert overlayer, wherein:

said overlayer comprises an alkaline earth metal fluoride that is substantially chemically inert with respect to titanium; and

said overlayer further comprises a metal intermixed with said metal fluoride, wherein said intermixed metal is softer than said base material.

28. A coated machine tool as claimed in claim 27 wherein said metal fluoride comprises calcium fluoride.

29. A coated machine tool as claimed in claim 27 wherein said metal fluoride comprises barium fluoride.

30. A coated machine tool as claimed in claim 27 wherein said intermixed metal comprises silver.

31. A coated machine tool as claimed in claim 27 wherein said overlayer comprises $CaF_2$ + Ag.

32. A coated machine tool as claimed in claim 27 wherein said overlayer comprises $BaF_2$ + Ag.

33. A coated machine tool as claimed in claim 27 wherein said overlayer has a thickness of at least about 0.5 microns.

34. A coated machine tool as claimed in claim 27 wherein said overlayer has a thickness of between about 1.5 and about 2 microns.

35. A coated machine tool as claimed in claim 27 wherein said coating further comprises a relatively hard underlayer formed between said chemically inert overlayer and said base material.

36. A process wherein a coated machine tool is produced by forming a relatively hard underlayer over a base material of said machine tool and forming a chemically inert yttrium oxide overlayer over said underlayer, wherein said overlayer and said underlayer are formed by:

introducing said base material into a vacuum deposition chamber;

evacuating said deposition chamber;

heating said base material in said deposition chamber;

activating selectively a plurality of cathodic arc discharge sources in communication with said deposition chamber, wherein one of said cathodic arc discharge sources comprises a yttrium source and another of said cathodic arc discharge sources comprises a source of underlayer material.

37. A process of coating a machine tool as claimed in claim 36 wherein at least one of said cathodic arc discharge sources are activated in a nitriding or carbonizing gas during formation of said underlayer and at least one of said cathodic arc discharge sources are activated in an oxidizing gas during formation of said overlayer.

38. A process of coating a machine tool as claimed in claim 36 wherein said cathodic arc discharge sources are activated in sequence.

39. A process of coating a machine tool as claimed in claim 36 wherein said cathodic arc discharge sources are activated simultaneously for at least a portion of a time during which said overlayer and said underlayer are formed.

40. A process of coating a machine tool as claimed in claim 36 wherein said cathodic arc discharge sources are activated simultaneously for a period of time sufficient to form said underlayer.

41. A process of coating a machine tool as claimed in claim 40 wherein said cathodic arc discharge sources comprise a yttrium-based discharge source and a titanium and aluminum-based source, and wherein said underlayer comprises TiAlYN.

42. A process of coating a machine tool as claimed in claim 36 wherein said plurality of cathodic arc discharge sources comprise a pair of filtered arc sources and a pair of direct arc sources.

43. A process wherein a coated machine tool is produced by forming a relatively hard underlayer over a base material of said machine tool and forming a chemically inert metal oxide overlayer over said underlayer, wherein said overlayer and said underlayer are formed by:

introducing said base material into a vacuum deposition chamber;

evacuating said deposition chamber;

heating said base material in said deposition chamber;

activating selectively a plurality of cathodic arc discharge sources in communication with said deposition chamber, wherein one of said cathodic arc discharge sources comprises a metal source and another of said cathodic arc discharge sources comprises a source of underlayer material.

44. A process wherein a coated machine tool is produced by forming a chemically inert alkaline earth metal fluoride overlayer intermixed with a metal softer than a base material of said

machine tool, wherein said overlayer is substantially chemically inert with respect to titanium and is formed over said base material by:

introducing said base material into a vacuum deposition chamber;

evacuating said deposition chamber;

introducing an inert gas into said deposition chamber;

initiating a magnetron sputtering operation in said deposition chamber, wherein said magnetron sputtering operation is characterized by deposition of a chemically inert alkaline earth metal fluoride and a soft metal over said base material.

45. A process of coating a machine tool as claimed in claim 44 wherein said magnetron sputtering operation comprises activation of a composite magnetron target including said chemically inert alkaline earth metal fluoride and said intermixed soft metal.